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THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP
600 GALLERIA PARKWAY
STE 1500
ATLANTA, GA 30339

EXAMINER	
NGO, NGUYEN HOANG	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/628,964	CHAUDHURI ET AL.	
	Examiner	Art Unit	
	Nguyen Ngo	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This communication is in response to the amendment of 10/19/2007. All changes made to the Claims have been entered. Accordingly, Claims 1-19 are currently pending in the application.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 1 recites the limitation "the first shortest path" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Stochastic Approaches to compute Shared Mesh Restored Lightpaths in Optical

Network Architectures by Bouillet, E., Labourdette, J-F, Ellinas, G., Ramamurthy, R., and Chaudhuri, S., hereafter referred to as Bouillet.

Regarding claim 1, Bouillet discloses a method of selecting paths (set-up the path, page 804,left column, paragraph 5) comprising:

a) determining a plurality of shortest paths from a source point to a destination point, wherein each shortest path comprises at least one communications link (compute k-shortest paths, page 804, left column, paragraph 5);

b) selecting a quantity of shortest paths from the plurality of shortest paths (compute k-shortest paths);

c) ordering the selected shortest paths from shortest path length to longest path lengths (Sort the paths by length and denominate them w1 to wk, page 804, left column, paragraph 5);

d) for each selected quantity of shortest paths (for each shortest path wi, page 804, left column, paragraph 5),

i) computing a cost of a first shortest path, wherein the cost of the first shortest path is substantially equal to a combined cost of communications links included in the first shortest path (compute the shortest path si using the metric defined in parts, page 804, left column, paragraph 5);

ii) computing an estimated cost of a second shortest path, wherein the estimated cost of the second shortest path is substantially equal to a combined estimated cost of communication links included in the second

shortest path, and wherein the combined estimated cost of a each communication link corresponds to using the link as scaled by a first probability that the link can be shared by the second shortest path and another path provisioned using a channel of the link (to each edge that shares a SRG with wi assign infinite weight and for each edge with reserved channel, set weight to cost of edges time the probability that no reserved channel is shareable, page 804, left column, paragraph 5) and ;

e) selecting a lowest estimated combined cost of the first shortest path and the second shortest path (select the minimum cost path pair, page 804, left column, paragraph 5).

It should further be noted that Applicant specifically states "Our method is described by Bouillet ... in a paper entitled "Stochastic Approaches to Route Shared Mesh Restored Lightpaths in Optical Mesh Networks, " in the Proceedings of the Conference on Computer Communications, in June 2002, on page 801 through 807", in the specification in paragraph [020].

Regarding claim 2 Bouillet discloses the method according to claim 1, wherein for the second shortest path, the cost of the link is estimated by;

a) assigning a first infinite cost to a first link included in the first shortest path;

b) assigning a second infinite cost to a second link that traverses at least one shared-risk-group (SRG) traversed by the first shortest path ((i) to each edge that shares a SRG with wi or has neither available channel nor reserved channel, assign infinite weight, page 804, left column, paragraph 5);

c) assigning to a third link not having an available shared protection channel a third cost substantially equal to the cost of allocating an additional shared protection channel to the link ((ii) for each edge without a reserved channel, set weight to cost of edge, page 804, left column, paragraph 5);

d) estimating for a fourth link having at least one available shared protection channel a cost corresponding to the cost of using the link scaled by a second probability that the link can be shared by the second path under consideration and no backup paths already provisioned using the link ((iii) for each edge with reserved channel, set weight to cost of edge times the probability that no reserved channel is shareable, page 804, left column, paragraph 5).

Regarding claim 3, Bouillet discloses the method of claim 2 wherein the probability that the link can be shared by the second path under consideration and no backup path already provisioned using the link is determined according to a method comprising;

a) creating a variable M, and assigning as its value the number of available shared protection channels in the link (M bins are the reserved channels, page 803, right column, paragraph 2);

b) for each j from 1 to N;

i) creating an array of N elements, SRGj, consisting of the N SRGs traversed by a proposed primary path (N SRGs traversed by the primary path for which a reserved channel is sought, page 803, right column, paragraph 2);

ii) creating an array of N elements, nj, consisting of the number of times SRGj is traversed by a primary path protected by a backup path already provisioned using channels of the link (page 803, right column, paragraph 2);

c) computing a probability, p, that one available shared protection channel of a link can be shared by a second shortest path and one backup path already provisioned sing the channel as p=]lj(1-nj/M), for j from 1 to N (page 803, right column, paragraph 1);

d) computing a probability, P, that no available shared protection channel of a link can be shared by a second shortest path with a backup path already provisioned using a channel of the link as P=(1-p)M, page 803, right column, paragraph 2).

Regarding claim 4, Bouillet discloses the method according to claim 1, wherein the lowest cost path pair is selected according to a method comprising;

a) defining an array of K elements, wi, where i ranges from 1 to K, including the ordered K first selected paths;

b) defining an array of K elements, si, where i ranges from 1 to K, including the K second shortest paths associated with the ordered K first selected paths;

c) defining a set, K, comprised of elements {wi,si}, where i ranges from 1 to K;

d) computing the combined estimated cost of the elements of set K, and ordering the elements from lowest combined estimated cost to highest combined estimated cost;

e) selecting the lowest combined estimated cost path pair in set K (page 804 left column).

Regarding claim 13, Bouillet discloses a shared mesh protection network wherein paths are provisioned according to a method comprising;

a) generating a list of primary paths and associated backup paths between a source network element and a destination network element (compute k-shortest paths, page 804, left column, paragraph 5);

b) selecting a firtst lowest estimated path pair from the list, where a first cost of the primary path is substantially equal to a second cost of the network resources included in the primary path and a third cost of the associated backup path corresponds to a fourth cost of the network resources included in the backup path scaled by a first probability that the network resources can be shared by the backup path (select minimum cost path pair, page 804, left column, paragraph 5);

c) using signaling to attempt to establish the selected path pair, use signaling to set-up the path, page 804, left column, paragraph 5);

d) eliminating the selected lowest estimated path pair from the list if it can not be established and attempting to establish a second lowest estimated cost path pair (page 804, left column, paragraph 5);

e) returning an error signal if no path pair from the list can be allocated (if no path can be found return NO-PATH, page 804, left column, paragraph 5).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 5-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stochastic Approaches to compute Shared Mesh Restored Lightpaths in Optical Network Architectures by Bouillet, E., Labourdette, J-F, Ellinas, G., Ramamurthy, R., and Chaudhuri, S., in view of Wu et al. (US 2004/0042406), hereafter referred to as Bouillet and Wu.

Regarding claim 5, Bouillet discloses a method of selecting paths comprising the steps of:

a) creating a first graph representing a network having a topology including network elements interconnected by communications links wherein each network represented by a vertex and each communication link interconnecting adjacent network elements is represented by an edge, the first graph including a source vertex corresponding to an ingress network element and a destination vertex corresponding to an egress network element (topology represented as a graph G(V,E), page 804, left column, paragraph 3);

b) using the first graph to calculate a plurality of paths between the source and destination vertices (bi-directional lightpaths from A to Z, page 804, left column, paragraph 4);

c) selecting a quantity of shortest paths between the source vertex and the destination vertex (compute k-shortest paths, page 804, left column, paragraph 5);

d) for each shortest path;

i) computing the cost of a first shortest path (assign weight, page 804, left column, paragraph 5);

iii) selecting a lowest estimated cost of a second shortest path from the source vertex to destination vertex from the second graph, wherein the lowest estimated cost of the second shortest path is substantially equal to the combined estimated costs of the edges comprising the second shortest path and the cost of using the edge scaled by a first probability that the edge can be shared by the second shortest path and another path already provisioned using a channel of the edge (page 804, left column, paragraph 5); and

e) selecting the lowest estimated combined cost of the first shortest path and the second shortest path (select minimum cost path pair, page 804, left column, paragraph 5).

Bouillet however fails to specifically disclose creating a second graph substantially based on the first graph wherein the second graph includes edges and estimated edge costs and a first edge associated with the first shortest path is modified from the first graph. Wu however discloses a method of generating a network graph from network information and calculating a primary explicit route through the network from the generated network graph (page 1 [0012]). It would thus be obvious to a person skilled in the art at the time the invention was made to incorporate the concept of generating a second graph based on network information (first graph information) which includes edge costs as disclosed by Wu into the Stochastic Approaches to Route Shared Mesh Restored Lightpaths in Optical Mesh Networks as disclosed by Bouillet in order to efficiently calculate paths through the network from source to destination.

Regarding claim 6, the combination of Bouillet and Wu, more specifically Wu discloses the method according to claim 5 wherein an edge associated with the first shortest path is removed from the second graph (the links not meeting the specified constraints got the path are eliminated from the graph, page 1[0012]).

Regarding claim 7, the combination of Bouillet and Wu, more specifically Bouillet discloses a method according to claim 5 wherein an edge associated with the first shortest path has an estimated edge cost set to a very high value (weight, page 804, left column, paragraph 5).

Regarding claim 8, the combination of Bouillet and Wu, more specifically Bouillet discloses a method according to claim 5 wherein an edge associated with the first shortest path has an estimated edge cost set to an infinite value (infinite weight, page 804, left column, paragraph 5).

Regarding claim 9, the combination of Bouillet and Wu, more specifically Bouillet discloses the method according to claim 5 wherein the quantity of the first shortest paths are ordered from a lowest cost to a highest cost (page 804, left column, paragraph 5).

Regarding claim 10, the combination of Bouillet and Wu, more specifically Bouillet the method according to claim 5, wherein a least estimated cost second shortest path is chosen from the second graph and for each second shortest path in the second graph, the cost of the link is estimated according to a method comprising;

i) assigning an infinite cost to a first edge that traverses at least one SRG traversed by the first shortest path ((i) to each edge that shares a SRG with wi or has neither

available channel nor reserved channel, assign infinite weight, page 804, left column, paragraph 5);

ii) assigning to a second edge without an available shared protection channel a second cost

substantially equal to a third cost of adding an additional shared protection channel to the edge ((ii) for each edge without a reserved channel, set weight to cost of edge, page 804, left column, paragraph 5); .

iii) estimating for a third edge having an available shared protection channel a forth cost corresponding to using the third edge scaled by second probability that the third edge can be shared by the second path under consideration and no backup paths already provisioned using the edge ((iii) for each edge with reserved channel, set weight to cost of edge times the probability that no reserved channel is shareable, page 804, left column, paragraph 5).

Regarding claim 11, the combination of Bouillet and Wu, more specifically Bouillet discloses the method of claim 10 wherein the probability that the edge can be shared by the second path under consideration and no backup path already provisioned using channels of the edge is estimated by;

a) creating a variable M, and assigning as its value to the number of available shared protection channels in the edge (M bins are the reserved channels, page 803, right column, paragraph 2);

b) for each j from 1 to N;

i) creating an array of N elements, SRGj, consisting of the N SRGs traversed by a proposed primary path (N SRGs traversed by the primary path for which a reserved channel is sought, page 803, right column, paragraph 2);

ii) creating an array of N elements, nj, consisting of the number of times SRGj is traversed by a primary path protected by a backup path already provisioned using channels of the link (page 803, right column, paragraph 2);

c) computing another probability, p, that one available shared protection channel of a link can be shared by a second shortest path and one backup path already provisioned sing the channel as p=]lj(1-nj/M), for j from 1 to N (page 803, right column, paragraph 1);

d) computing a probability, P, that no available shared protection channel of a link can be shared by a second shortest path with a backup path already

provisioned using a channel of the link as P=(1-p)M, page 803, right column, paragraph 2).

Regarding claim 12, the combination of Bouillet and Wu, more specifically Bouillet discloses the method of claim 5, wherein the lowest estimated combined cost first and second shortest path pair is selected according to a method comprising;

a) creating a set, S, with K elements {wi,si}, where i ranges from 1 to K, including the K first shortest paths, wi, and K associated selected second shortest paths, si (Set S, page 804, left column, paragraph 5);.

b) for each first shortest path, wi, where i ranges from 1 to K;

ii) computing a cost substantially equal to the combined cost of the links included in the first shortest path;

ii) computing an estimated cost for the associated selected second shortest path substantially equal to the combined estimated cost of the links comprising the selected second shortest path page 804, left column, paragraph 5);

d) selecting the lowest combined estimated cost path pair (select minimum cost pair, page 804, left column, paragraph 5).

Bouillet however fails to specifically disclose ordering the elements of set S from lowest combined estimated cost to highest combined estimated cost. However this procedure would have been obvious to a person skilled in the art at the time the invention was made in order to efficiently determine the lowest combined estimated cost path pair in a reliable manner.

6. Claims 14- 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stochastic Approaches to compute Shared Mesh Restored Lightpaths in Optical Network Architectures by Bouillet, E., Labourdette, J-F, Ellinas, G., Ramamurthy, R., and Chaudhuri, S., in view of Ishibashi et al. (US 2003/0147352), hereafter referred to as Bouillet and Ishibashi.

Regarding claim 14, Bouillet fails to specifically disclose the network of Claim 13 wherein path provisioning is controlled by the source network element and the signaling is used between the source network element and each network element in the primary and backup paths to establish links between adjacent network elements. However this is a well-known technique known in the art. Ishibashi further discloses that when a path setup request is generated from the source, the network calculates a pair of SRLF-disjoint working and protection paths and that a signaling message is then transmitted through the network and that bandwidth reservation is performed for both working and

protection paths (page 1 [0008]). It would thus be obvious at the time the invention was made to incorporate the well known concept of establishing primary and backup paths between adjacent network nodes through signaling as disclosed by Ishibashi into the Stochastic Approaches to Route Shared Mesh Restored Lightpaths in Optical Mesh Networks as disclosed by Bouillet in order to efficiently establish primary and backup paths through a network.

Regarding claim 15, the combination of Bouillet and Ishibashi further discloses the network of claim 14, wherein said signaling comprises;

a) for each network element in the primary path, sending from the source network element to the network element a request for the network element to establish a link with adjacent network elements (signaling message transmitted through the network and bandwidth reservation is performed for the working path, page 1 [0008]);

b) for each network element in the backup path, sending from a source network element to the network element a request for the network element to establish a link with adjacent network elements (signaling message transmitted through the network and bandwidth reservation is performed for the protection path, page 1 [0008]);

c) for each network element in the primary path that can not establish a link to an adjacent network element, sending from the network element to the source network element an error signal (rejected request, page 6 [0081]);

d) for each network element in the primary path that can establish a link to an adjacent network element, sending from the network element to the source network element a valid link signal (page 7 [0097]);

It should be noted that the steps of establishing links in a network via error signals and valid link signals is a well known concept known in the art.

Regarding claim 16, the combination of Bouillet and Ishibashi discloses the network of Claim 13 wherein the network has a single network controller and signaling between the single network controller and the network elements is used to provision the primary and backup paths (network controller of figure 1 and page 6 [0082]).

Regarding claim 17, the combination of Bouillet and Ishibashi fail to disclose the specific limitation of a reallocation of existing network resources is initiated at any time. However this would have been obvious to a person skilled in the art at the time the invention was made as this is simply a network parameter informing when reallocation should be determined.

Regarding claim 18, the combination of Bouillet and Ishibashi fail to disclose the specific limitation reallocation of existing network resources is initiated at each request of a communications service. However this would have been obvious to a person skilled in the art at the time the invention was made, as this is simply a network parameter informing when reallocation should be determined.

Regarding claim 19, the combination of Bouillet and Ishibashi fail to disclose the specific limitation reallocation of existing network resources is initiated at regularly scheduled intervals. However this would have been obvious to a person skilled in the art at the time the invention was made, as this is simply a network parameter informing when reallocation should be determined.

Response to Arguments

7. Applicant's arguments filed 10/19/2007 have been fully considered but they are not persuasive.

8. Applicant argues that Bouillet does not disclose cost assessment based upon link sharing capabilities. Examiner respectively disagrees as Bouillet discloses set a weight to cost of edge times the probability that no reserved channel is shareable (link sharing capabilities, page 804, left column, paragraph 5). It should further be noted that Applicant specifically states "Our method is described by Bouillet ... in a paper entitled "Stochastic Approaches to Route Shared Mesh Restored Lightpaths in Optical Mesh

Networks, " in the Proceedings of the Conference on Computer Communications, in June 2002, on page 801 through 807", in the specification in paragraph [020].

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nguyen Ngo whose telephone number is (571) 272-8398. The examiner can normally be reached on Monday-Friday 7am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Firmin Backer can be reached on (571) 272-6703. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Nguyen Ngo
United States Patent & Trademark Office
Patent Examiner AU 2663
(571) 272-8398

11/4/07

BRIAN NGUYEN
PRIMARY EXAMINER